WHAT IS CLAIMED IS:

We claim:

1. A method for determining the position of an object in a system comprising multiple sensors arranged at differing heights and including a reference sensor the method comprising:

transmitting or reflecting a signal from a object;

determining the time of transmission or reflection of the signal from the object;

receiving the transmitted or reflected signal at the multiple sensors;

determining the time of arrival (TOA) of the signal at each sensor;

calculating a slant range from the object to each sensor;

calculating a position vector of the object.

2. The method of claim 1, wherein the slant range from the object to each sensor is calculated by $sr\_0_{in} = c\left(t\_0_{in} - t_{tgt}\right)$.

3. The method of claim 1, wherein the position vector of the object may be calculated based on the time of arrival of the transmitted or reflected signal at each sensor, the slant range from the object to each sensor, and the known position of each sensor.

4. A method for determining the position of a object in a system comprising multiple sensors arranged at differing heights and including a reference sensor the method comprising:

transmitting or reflecting a signal from a object;

determining the time of transmission or reflection of the signal from the object;

receiving the transmitted or reflected signal at the multiple sensors;

determining the time difference of arrival (TDOA) of the signal at each sensor;

calculating a slant range from the object to each sensor;

calculating a position vector for the object.

5. The method of claim 4, wherein the slant range from the object to each sensor is calculated by $sr\_0_{in} = c\left(t\_0_{in} - t_{tgt}\right)$.

6. The method of claim 4, wherein the position vector of the object may be calculated based on the time of arrival of the transmitted or reflected signal at each sensor, the slant range from the object to each sensor, and the known position of each sensor.

7. A method for determining the position of an object in a system comprising a sensor arranged at a determinable location and a secondary surveillance device that, at a determinable transmission time, transmits an interrogator signal that is reflected off the object, or received and retransmitted by the object, to a secondary sensor, the method comprising:

obtaining a time of arrival for a signal received at the sensor;

obtaining a secondary time of arrival for the reflected or retransmitted interrogator signal received at the secondary sensor;

calculating a slant range from the object to the sensor based, at least in part, upon the obtained time of arrival at the sensor;

calculating a secondary slant range from the object to the secondary sensor based, at least in part, upon the obtained secondary time of arrival at the secondary sensor; and

determining a position vector based, at least in part upon the transmission time of the interrogator signal, the calculated slant range and the calculated secondary slant range.

8. The method of claim 7, wherein the slant range from the object to the sensor is computed by $sr\_0_{in} = c(t\_0_{in} - t_{tgt})$.

9. The method of claim 7, wherein the secondary slant range from the object to the secondary sensor is computed by $Sr_0 = c(t_{tgt} - t_0)$.

10. A method for determining the position of an object in a system comprising a sensor arranged at a determinable location, the method comprising:

obtaining a time of arrival for a signal received at the sensor;

calculating a slant range from the object to the sensor based, at least in part, upon the obtained time of arrival; and

determining a position vector based, at least in part, upon the calculated slant range and the location of the sensor.

11. The method of claim 10 wherein the time of arrival is obtained from a signal transmitted from the object.

12. The method of claim 10 wherein the time of arrival is obtained from a signal reflected from the object.

13. The method of claim 10 wherein calculating the slant range further comprises:

adding a known distribution of noise to the time of arrival prior to calculating the slant range.

14. The method of claim 13 wherein the known distribution of noise comprises a Gaussian noise distribution with a variance of $\sigma^2$.

15. The method of claim 10 wherein determining a position vector further comprises:

calculating an error norm for each possible position vector solution; and

selecting as the object position vector the position vector solution with the smallest error norm.

16. A method for determining the position of an object in a system comprising a sensor arranged at a determinable location and a reference sensor, the method comprising:

obtaining a time difference of arrival for a signal received at the sensor with respect to a signal received at the reference sensor;

calculating a slant range from the object to the sensor based, at least in part, upon the obtained time difference of arrival; and

determining a position vector based, at least in part, upon the calculated slant range and the location of the sensor.

17. A system for determining the position of an object, the system comprising:

a sensor, arranged at a determinable location, that obtains a time of arrival for a signal received at the sensor;

a secondary surveillance device that, at a determinable transmission time, transmits an interrogator signal that is reflected off the object, or received and retransmitted by the object, to a secondary sensor and obtains a secondary time of arrival for the reflected or retransmitted interrogator signal received at the secondary sensor;

a slant range calculator that calculates a slant range from the object to the sensor based, at least in part, upon the obtained time of arrival at the sensor;

a secondary slant range calculator that calculates a secondary slant range from the object to the secondary sensor based, at least in part, upon the obtained secondary time of arrival at the secondary sensor; and

a position vector calculator that determines a position vector based, at least in part upon the transmission time of the interrogator signal, the calculated slant range and the calculated secondary slant range.

18. A system for determining the position of an object, the system comprising:

a sensor arranged at a determinable location;

a reference sensor, wherein a time difference of arrival is obtained for a signal received at the sensor with respect to a signal received at the reference sensor;

a slant range calculator that calculates a slant range from the object to the sensor based, at least in part, upon the obtained time difference of arrival; and

a position vector calculator that determines a position vector based, at least in part, upon the calculated slant range and the location of the sensor.

19. A system for determining the position of an object, the system comprising:

a sensor arranged at a determinable location wherein the sensor obtains a time of arrival for a signal received at the sensor;

a slant range calculator that calculates a slant range from the object to the sensor based, at least in part, upon the obtained time of arrival; and

a position vector calculator that determines a position vector based, at least in part, upon the calculated slant range and the location of the sensor.